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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
| 10/724,570 | 11/26/2003 | Akira Tanaka | 81788.0263 | 8635 |
| 26021 7590 04/27/2007 HOGAN & HARTSON L.L.P. 1999 AVENUE OF THE STARS SUITE 1400 LOS ANGELES, CA 90067 | | | EXAMINER VAN ROY, TOD THOMAS | |
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| SHORTENED STATUTORY PERIOD OF RESPONSE | | MAIL DATE | DELIVERY MODE | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/724,570

Applicant(s)

TANAKA ET AL.

Examiner

Tod T. Van Roy

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 February 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 and 11-17 is/are pending in the application.
- 4a) Of the above claim(s) 19 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,5-8 and 11-17 is/are rejected.
- 7) ☒ Claim(s) 3 and 4 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 September 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Response to Arguments

Applicant's arguments filed 02/12/2007 have been fully considered but they are not persuasive.

With respect to claim 1 being anticipated by Chino:

In response to applicant's arguments, the recitation "...exhibits self-sustained pulsation in a predetermined output region..." has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

With respect to the rejections in view of Abe and Chino:

The examiner agrees that the previous rejection was mistakenly addressed as Chino in view of Abe, while it is more correctly addressed as Abe in view of Chino. This has been clarified in the rejection that follows.

The applicant has stated that "Inverted mesas do not result from the processing described in the Abe patent". The examiner agrees that Abe does not discuss the formation of inverted mesas, however, the examiner notes that Abe need not discuss forming an inverted mesa. The fact that Chino describes a similar mesa structure

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wherein the formation of an inverted mesa is taught to be disadvantageous, and how to avoid forming the inverted structure, provides motivation for one of ordinary skill in the art to make the combination. As the processing of Abe differs from that of Chino (wet vs. dry etching, respectively), one of ordinary skill in the art would see differences in the techniques, and be motivated to use Chino's techniques to avoid the inverted mesa formation.

The applicant has further argued that the processing type of Chino increases damage and was understood at the time of the invention to not be compatible with self-sustained pulsation lasers (device type of Abe). The examiner notes col.6 lines 40-47 and col.6 lines 56-62 of Chino, which teach improved dry etching chemical combinations as well as sputtering techniques which produce smooth side-walls beneficial for trapezoid type formations (used by both Chino and Abe). As the prior art may have taught dry etching to coincide with increased damage, the examiner is of the belief that Chino teaches improved methods that reduce the amount of damage incurred.

The examiner concedes that Abe's device is directed towards self-sustained pulsation operation, which is not taught by Chino. Chino, however, is not relied upon to teach this type of operation, but merely how to form mesa structures with a method to insure reliability by prevention of inverted mesa formation. Additionally, the two mesa structures are believed to be of nearly the same dimensions (ratio of the width of upper surface to lower) as Chino teaches a defined range of 60-90 degrees for the side surface angle, very similar to that shown in the figures of Abe.

For the reasons stated above, the examiner is of the belief that the mesa structural similarities of Abe and Chino are apparent, and that Chino teaches a different methodology of forming the mesa which insures an inverted mesa will not be formed, so that one of ordinary skill in the art would have a reasonable expectation of success for combining the two teachings.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Chino et al. (US 6266354).

With respect to claim 1, Chino discloses a semiconductor laser element comprising: a substrate (fig.13a #1301); a first conductive type clad layer formed on said substrate (fig.13a #1302 n); an active layer formed on said first conductive type clad layer for emitting light by current injection (fig.13a #1303); a second conductive type first clad layer formed on said active layer (fig.13a #1304 p); and a stripe-shaped second conductive type second clad layer formed on said second conductive type first

clad layer (fig.13b #1306 p) in a first direction, in such a manner that the cross-sectional surface of said stripe-shaped second conductive type second clad layer in a direction perpendicular to said first direction has a shape having an upper edge and a lower edge that face each other and side edges that connect between said upper edge and said lower edge, where the minimum width thereof is at least 70% but no more than 100% of the maximum width (col.16 lines 41-48, angle between 60-90 degrees, so when at or near 90 degrees the upper edge is greater than 70% but less than 100% of the lower edge), wherein the angle between each of said side edges and said lower edge of said stripe-shaped second conductive type second cladding layer is at least about 70 degrees but no more than 100 degrees at a portion that is at least 60% of the upper side of said stripe-shaped second conductive clad layer (col.16 lines 41-48, angle between 60-90 degrees for the entire edge).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

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4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-2, 5-8, and 11-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Abe (US 6757311) in view of Chino.

With respect to claim 1, Abe teaches a semiconductor laser element that exhibits self-sustained pulsation (col.6 lines 1-12) in a predetermined output region, said semiconductor laser element comprising: a substrate (fig.1a #30); a first conductive type clad layer formed on said substrate (fig.1a #37 n); an active layer formed on said first conductive type clad layer for emitting light by current injection (fig.1a #38); a second conductive type first clad layer formed on said active layer (fig.1a #39 p); and a stripe-shaped second conductive type second clad layer formed on said second conductive type first clad layer (fig.1a #41 p) in a first direction, in such a manner that the cross-sectional surface of said stripe-shaped second conductive type second clad layer in a direction perpendicular to said first direction has a shape having an upper edge and a lower edge that face each other and side edges that connect between said upper edge and said lower edge, where the minimum width thereof is at least 70% but no more than 100% of the maximum width (fig.1b, #41 upper edge greater than 70% but less than 100% of the lower edge). Abe does not teach the angle between each of said side edges and said lower edge of said stripe-shaped second conductive type second cladding layer is at least about 70 degrees but no more than 100 degrees at a portion that is at least 60% of the upper side of said stripe-shaped second conductive clad layer. Chino teaches a similar laser diode containing a stripe-shaped second conductive cladding layer wherein the angle of the side edges are taught to be from 60-90 degrees

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(col.16 lines 41-48). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the stripe of Abe with the angled stripe of Chino in order to prevent the formation of an inverted mesa, and avoid reducing device reliability (Chino col.15 lines 4-13).

With respect to claim 2, Abe teaches the shape of the cross-sectional surface of the stripe shaped second conductivity type second clad layer is a shape such that the width of said upper edge is less than the width of said lower edge, and said side edges widen from said upper edge to said lower edge (fig.1b #41).

With respect to claim 5, Abe teaches the width of the lower edge of said stripe-shaped second conductive type second clad layer is at least 3 μm (col.8 lines 26-32, width of lower edge is greater than SW which is taught to be from 1.5-5 μm).

With respect to claim 6, Abe and Chino teach the laser device as outlined in the rejection to claim 1, as well as the use of a material, in a second device structure, to emit light at 780nm. Abe does not teach the material to be used in the first embodiment, which discloses claim 1, or that the material be $\text{Al}(y)\text{Ga}(1-y)\text{As}$ ($0 \leq y \leq .2$) or the thickness to be at least 20 but no more than 60 nm. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the material of Abe emitting at 780nm with the first structure of Abe and Chino in order to induce self-pulsation and reduce feedback noise in a frequency usable with CD's (Abe col.1 lines 25-37), as well as to use a material of $\text{Al}(y)\text{Ga}(1-y)\text{As}$ ($0 \leq y \leq .2$) or the thickness to be at least 20 but no more than 60 nm, since the wavelength taught by Abe is emitted by this material, and the composition and thickness would be obvious optimizations of

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the taught subject matter (see MPEP 2144.05 II A - Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955)).

With respect to claim 7, Abe and Chino teach the laser device as outlined in the rejection to claim 6, and Abe additionally teaches the second conductivity type second clad layer is formed of InGaAlP (col.5 lines 51-52), but does not teach the composition of the layer to be $\text{In}_{0.5}(\text{Ga}_{1-x}\text{Al}_x)_{0.5}\text{P}$. It would have been obvious to one of ordinary skill in the art at the time of the invention to use a material of $\text{In}_{0.5}(\text{Ga}_{1-x}\text{Al}_x)_{0.5}\text{P}$ as the composition would be an obvious optimization of the taught subject matter (see MPEP 2144.05 II A - Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955)).

With respect to claim 8, Abe and Chino teach the laser device as outlined in the rejection to claim 1, as well as the use of a material to emit light at 650nm including a multiple quantum well and barrier layers (col.5 lines 43-58). Abe does not teach the use of between 5-9 layers of $\text{In}_{0.5}(\text{Ga}_{1-u}\text{Al}_u)_{0.5}\text{P}$ with $0 \leq u \leq .2$ and barrier layers of $\text{In}_{0.5}(\text{Ga}_{1-v}\text{Al}_v)_{0.5}\text{P}$ with $.2 \leq v \leq .6$ and a well thickness of 4-8nm. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the material of Abe emitting at 650nm with material having a composition and thickness of: between 5-9 layers of $\text{In}_{0.5}(\text{Ga}_{1-u}\text{Al}_u)_{0.5}\text{P}$ with $0 \leq u \leq .2$ and barrier layers of $\text{In}_{0.5}(\text{Ga}_{1-v}\text{Al}_v)_{0.5}\text{P}$ with $.2 \leq v \leq .6$ and a well thickness of 4-

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8nm, since the wavelength taught by Abe is emitted by this material, and the composition and thickness would be obvious optimizations of the taught subject matter (see MPEP 2144.05 II A - Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955)).

With respect to claim 11, Abe and Chino teach the structure outlined in the rejection to claim 1, as well as the material types outlined in the rejections to claims 6-8, and additionally teach the integration of two lasers emitting at different wavelengths being integrated onto the same substrate (fig.5a). Abe does not teach the structure of claim 1 combined with the material of claim 6 to be integrated onto the substrate (fig.5a LD1, non-pulsation) in addition to the disclosed structure (fig.5a LD2 and claim 1, self-pulsation). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the disclosed first structure (self-pulsation, claim 1) with the deemed obvious combination structure (claim 6) onto one substrate in order to allow for self-pulsation operation in both devices and the reduction of noise due to returned light (Abe, col. 1 lines 25-37).

Claim 12 is rejected for the same reasons outlined in the rejection of claim 2 above.

Claim 13 is rejected for the same reasons outlined in the rejection to claim 5 above.

Claim 14 is rejected for the same reasons outlined in the rejection to claim 6 above.

Claim 15 is rejected for the same reasons outlined in the rejection to claim 8 above.

With respect to claim 16, Abe and Chino teach the dual wavelength laser structure as outlined in the rejection to claim 11, including the material types (col.5 lines 49-50, #39). Abe does not teach the specific composition of $\text{In}_{0.5}(\text{Ga}_{1-t}\text{Al}_t)_{0.5}\text{P}$ with $0.6 \leq t \leq 1$ or that the thickness be 0.15-0.45 μm . It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the material of Abe with material having a specific composition and thickness of: $\text{In}_{0.5}(\text{Ga}_{1-t}\text{Al}_t)_{0.5}\text{P}$ with $0.6 \leq t \leq 1$ or that the thickness be 0.15-0.45 μm , since the composition and thickness would be obvious optimizations of the taught subject matter (see MPEP 2144.05 II A - Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955)).

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Abe and Chino in view of Fujii (US 5822348).

With respect to claim 17, Abe and Chino teach the self-sustained pulsed laser device as outlined in the rejection to claim 11, but do not teach the use of current blocking layers. Fujii teaches a self-sustained pulsed laser (fig.5) which includes the use of InGaAlP current block layers on either side of the second conductive type second semiconductor layer (fig.5 #207). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the laser device of Abe and Chino with

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the current block layers of Fujii in order to better limit the current injected into the active region and allow for a supersaturation absorption layer and superior self-pulsation operation (Fujii, col.5 lines 36-44), as well as the specified composition of $\text{In}_{0.5}(\text{Ga}_{1-w}\text{Al}_w)_{0.5}\text{P}$ with $0.7 \leq w \leq 1$ as the composition would be obvious optimization of the taught subject matter (see MPEP 2144.05 II A - Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955)).

Allowable Subject Matter

Claims 3-4 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

With respect to claim 3, the prior art was not found to teach the claimed device limitations found in claim 1 along with the width of the upper edge being greater than the width of the lower edge, causing the side edges to narrow inward from the upper to lower edges. Prior art such as 6031858 and 5701322 were found to teach narrowed edges, but lacked motivation to combine with Abe and Chino. In addition, Chino teaches away from the upper edge being greater than the lower edge noting reduced reliability in an inverted mesa structure (col.15 lines 10-13). As the prior art was not found to teach the combination of the claimed limitations, or to provide motivation for a combination, the claim is believed to be allowable.

With respect to claim 4, similar to claim 3, the prior art was found to teach inward sloping edges between the upper and lower portions (US 6031858, 5701322, 2001004362), but did not provide teaching such that the edges maintained an angle of between 70-100 degrees at a point at least 60% of the thickness of the layer. As the prior art was not found to teach the combination of the claimed limitations, or to provide motivation for a combination, the claim is believed to be allowable.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tod T. Van Roy whose telephone number is (571)272-8447. The examiner can normally be reached on M-F.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on (571)272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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PRIMARY EXAMINER